



PHASE II DIOXIN SITE INVESTIGATION

FINAL REPORT

**STANDARD CHLORINE
CHEMICAL COMPANY, INC.
KEARNY, NEW JERSEY**

**NEW JERSEY DEPARTMENT OF
ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT
HAZARDOUS SITE MITIGATION ADMINISTRATION
TRENTON, NEW JERSEY**

ECJORDANCO

DECEMBER 1985

PHASE II DIOXIN SITE INVESTIGATION
FINAL REPORT

FOR

STANDARD CHLORINE CHEMICAL COMPANY, INC.
KEARNY, NEW JERSEY

Submitted To

New Jersey Department of Environmental Protection
Division of Waste Management
Hazardous Site Mitigation Administration
428 East State Street
Trenton, New Jersey 08625

By

E.C. Jordan Co.
P.O. Box 7050, DTS
Portland, Maine 04112

December 1985

TABLE OF CONTENTS

| SECTION | TITLE | PAGE NO. |
|---------|--|----------|
| 1.0 | BACKGROUND | 1 |
| 1.1 | Project Description | 1 |
| 1.2 | Site Location | 2 |
| 1.3 | Site Topography and Layout | 2 |
| 1.4 | Environmental Setting | 4 |
| 1.5 | Site Use History. | 6 |
| 2.0 | POTENTIAL DIOXIN CONTAMINATION | 7 |
| 2.1 | Use, Production or Disposal of Dioxin-Associated Chemicals. | 7 |
| 2.2 | Storage and Handling Methods. | 8 |
| 2.3 | Past Sampling Efforts | 8 |
| 3.0 | SITE RECONNAISSANCE AND RATIONALE FOR SAMPLING LOCATIONS. | 9 |
| 3.1 | Summary of Site Reconnaissance. | 9 |
| 3.2 | Rationale for Sampling Locations. | 10 |
| 4.0 | SAMPLE COLLECTION AND ANALYSIS | 11 |
| 4.1 | Summary of Sampling Episode | 11 |
| 4.2 | Summary of Results. | 12 |
| 4.3 | Assessment of the Need for Further Dioxin Sampling. | 17 |

REFERENCES

| | |
|------------|--------------------------------------|
| APPENDIX A | Site Sampling Plan |
| APPENDIX B | Site Specific Health and Safety Plan |
| APPENDIX C | Field Data Sheets |
| APPENDIX D | Slides of Sampling Locations |

LIST OF TABLES

| TABLE NO. | TITLE | PAGE NO. |
|-----------|--|----------|
| 1 | RESULTS OF 2,3,7,8-TCDD ANALYSIS | 15 |

LIST OF FIGURES

| FIGURE NO. | TITLE | PAGE NO. |
|------------|---|----------|
| 1 | SITE LOCATION MAP | 3 |
| 2 | SITE PLAN | 5 |
| 3 | SAMPLE LOCATIONS AND ANALYTICAL RESULTS | 14 |

STANDARD CHLORINE CHEMICAL COMPANY, INC.
KEARNY, NEW JERSEY

1.0 BACKGROUND

1.1 Project Description

The New Jersey Department of Environmental Protection (NJDEP), in cooperation with the U.S. Environmental Protection Agency (EPA), is responsible for the identification and assessment of potential dioxin contamination in the State of New Jersey. During Phase I of the Dioxin Site Investigation Program, the NJDEP collected and analyzed soil samples from nine sites where compounds known to be associated with dioxin were produced. As part of Phase II of the program, soil and sediment samples from an additional 23 sites selected by the NJDEP were analyzed for dioxin contamination.

This report summarizes the Phase II dioxin investigation of Standard Chlorine Chemical Company, Inc. (Standard Chlorine) in Kearny, NJ conducted by E.C. Jordan under contract to the NJDEP. The investigation consisted of five major tasks: (1) file review; (2) site reconnaissance; (3) sample collection; (4) sample analysis; and (5) report preparation.

Records on file at the following offices of the NJDEP were examined during the file review:

- o Division of Waste Management, Hazardous Site Mitigation Administration, Trenton (HSMA);
- o Division of Waste Management, Bureau of Field Operations, Parsippany-Troy and Yardville (DWM);
- o Office of Science and Research, Industrial Investigation Unit, Trenton (OSR); and
- o Division of Water Resources, Trenton (DWR).

Records on file at EPA's Region II Office in Edison, NJ were also reviewed.

During the site reconnaissance, site personnel were interviewed to confirm file information. Sample locations were selected based on the site use history and observations made during the reconnaissance. The sample location selection process was designed to include those areas with the greatest potential for dioxin contamination. Because of the low mobility of dioxin in soils, most samples were collected within the surficial soil stratum (0 to 6 inches). Samples were delivered to the Environmental Testing and Certification Corporation (ETC) in Edison, NJ for analysis of dioxins, in particular the chlorinated dioxin isomer, 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). One sample was subsequently sent to California Analytical Laboratories (Cal-Analytical) in West Sacramento, CA for re-analysis.

1.2 Site Location

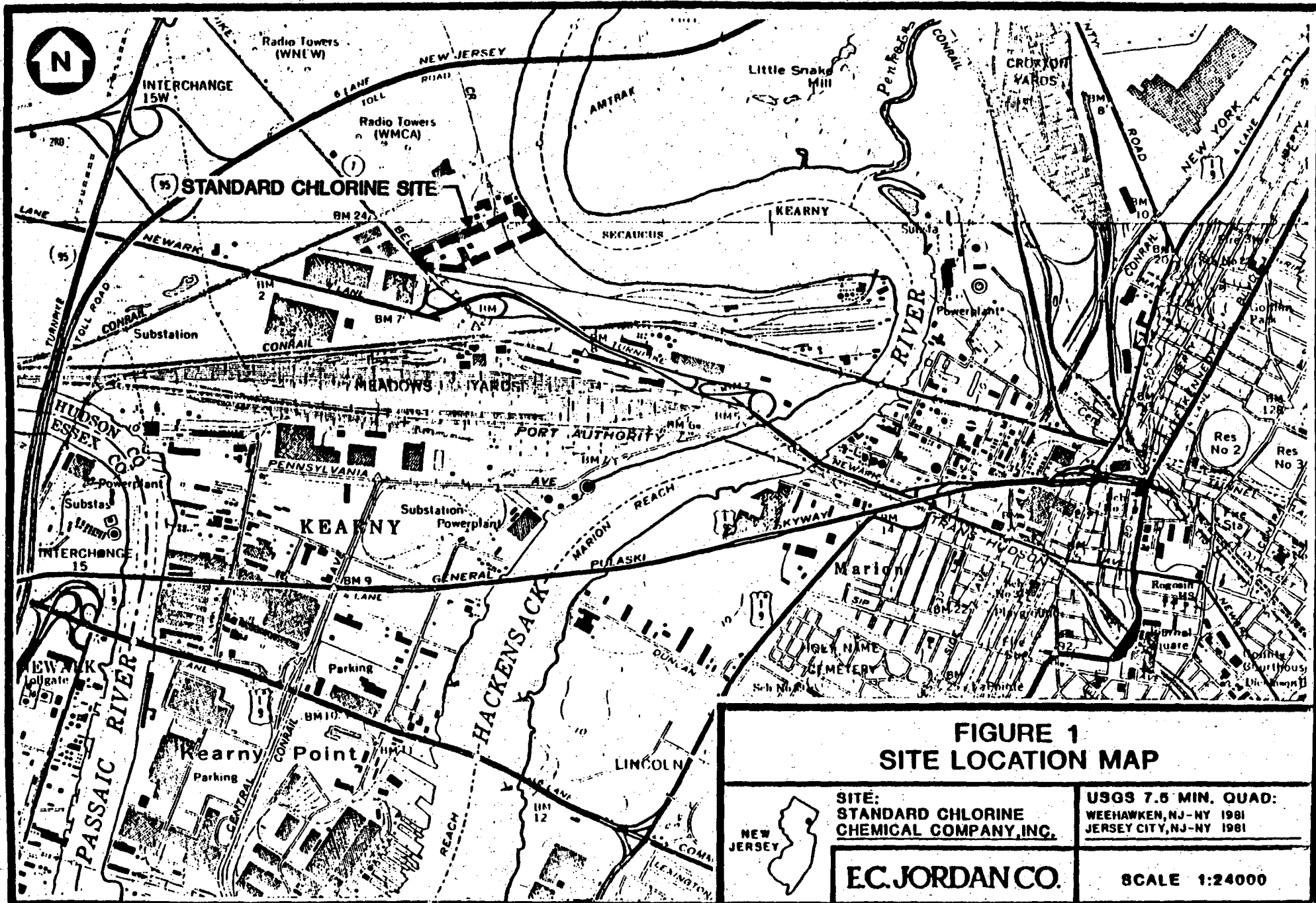
Standard Chlorine Chemical Company, Inc.
1035 Belleville Turnpike
Kearny, New Jersey 07032

Hudson County
Latitude 40°44'57" Longitude 74°05'57"

Kearny is located in northeastern New Jersey, approximately 4 miles northeast of Newark. The site is just east of the New Jersey Turnpike (Exit 15W) on the Hackensack River, adjacent to the abandoned Diamond Alkali site which is also included in the Phase II Dioxin Site Investigation Program (Figure 1).

1.3 Site Topography and Layout

Standard Chlorine is on the extensive low-lying floodplain of the Hackensack River. The site is nearly flat with an average elevation of 5 feet above mean sea level. Much of the land to the north of Standard Chlorine is



undeveloped marsh. From the site south to Kearny Point, the marsh has been filled and is heavily industrialized (Figure 1).

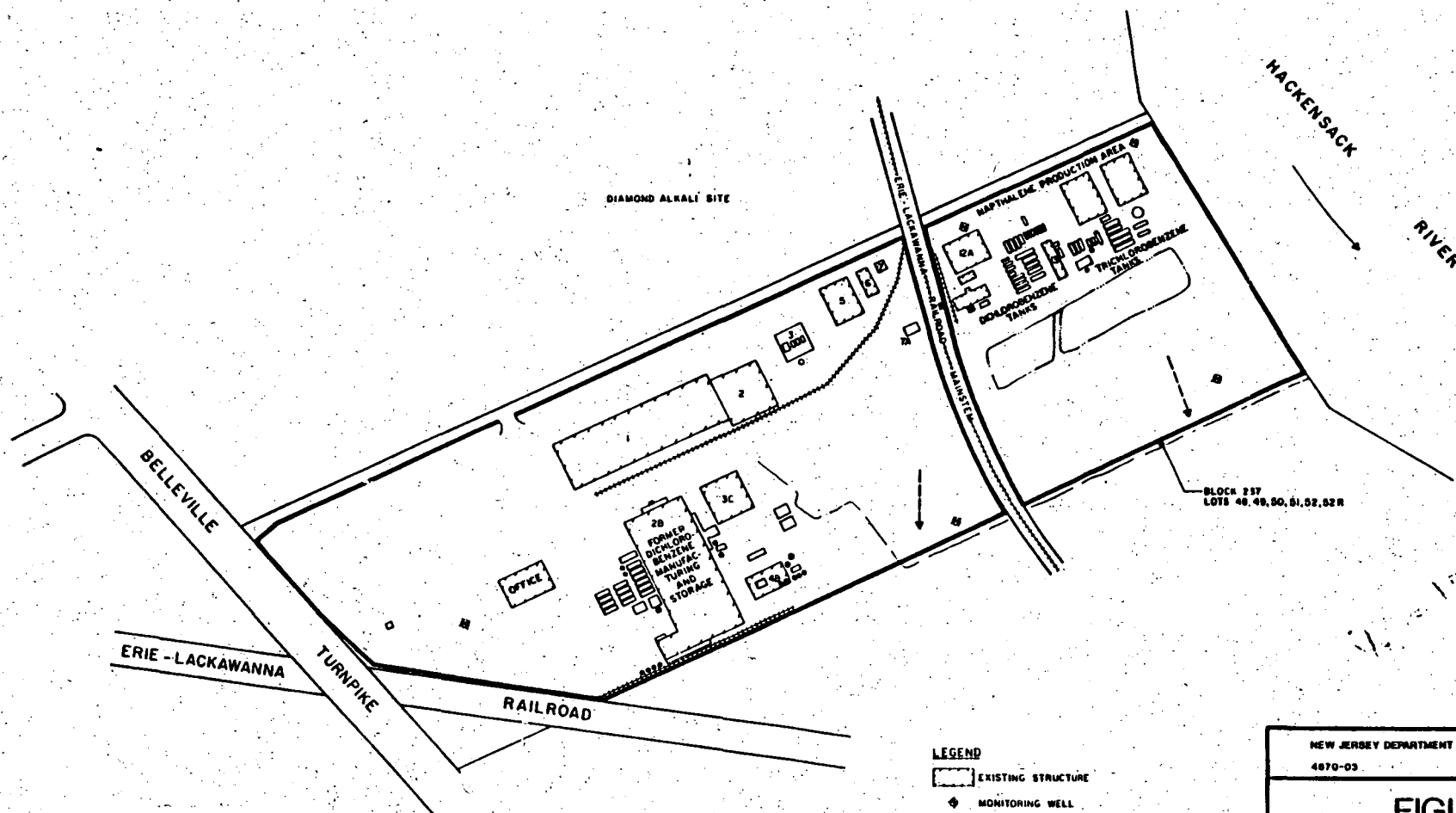
Figure 2 depicts the layout of the 24.5-acre Standard Chlorine site.

1.4 Environmental Setting

Roy F. Weston, Inc. completed a hydrogeologic investigation of the Standard Chlorine site for the NJDEP in January 1984 (8). This report contains a detailed description of the environmental setting of the plant. The site is covered by 5 to 10 feet of fill composed of chromium-laden slag and silty sand. The original ground consists of 2 to 5 feet of dark organic silt, humus, and peat which is referred to as meadow mat. The mat is underlain by 4 to 7 feet of very fine to coarse sand and then a layer of stiff clay. Beneath the clay, glacial till is found down to bedrock which is encountered 50 to 100 feet below the ground surface. The bedrock consists of red shales and sandstones of the Brunswick Formation (8).

Weston installed monitoring wells in July 1983 at the locations shown in Figure 2. Using data from these wells, they concluded that there are two shallow groundwater flow systems beneath the site. A water table aquifer is perched above the meadow mat in the fill material and a semi-artesian system exists in the sand layer underlying the mat. The direction of flow in both systems is generally south-southwest. There is the potential for vertical migration of groundwater downward through the meadow mat (8).

There is also a deep bedrock aquifer at the site which is used as a water supply source in the area. Weston concluded that the thick layer of clay and glacial till separating the shallow and deep aquifers would function as an aquitard (8).



BASE MAP SOURCE: PROPERTY MAPS TAKEN FROM THE TAX MAP FOR THE TOWN OF SEABY, N.J. SHIRT NO. 10 DATED JANUARY 24, 1965. BUILDING LOCATIONS ARE BASED ON A SITE PLAN DATED JUNE 1980 SUPPLIED BY STANDARD CHLORINE CHEMICAL CO.

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
4870-03 JUNE 1988

FIGURE 2 SITE PLAN

SITE: STANDARD CHLORINE
CHEMICAL COMPANY, INC.

EC.JORDAN CO.

0 100 FEET

Standard Chlorine has a permit to discharge non-contact cooling water directly into the adjacent Hackensack River. The site is also underlain by a system of drains which discharge to the river. In addition, surface runoff from the site and overflow from an on-site lagoon enter the river. This section of the Hackensack was used by local residents for recreational fishing and crabbing (2). These activities have been banned by the NJDEP because of dioxin contamination found in the blue claw crab (10).

1.5 Site Use History

Koppers Inc. refined crude naphthalene at the site during the 1950's. The Standard Chlorine Chemical Co. bought the property from Koppers in 1962 and acquired additional small portions of the present site from the Edison Co. and the Keating Rubber Co. (5). Standard Chlorine used to manufacture moth balls, crystals, and cakes from naphthalene and from paradichlorobenzene. They also packaged a drain cleaner called "Chloroben", made from orthodichlorobenzene. The paradichlorobenzene operation was discontinued in 1975 and the naphthalene plant was closed in July 1980. Only the Chloroben formulation operation is still active. The site is also used for office and warehouse purposes (5,9).

A Selected Substances Report completed by Standard Chlorine in August 1980 lists the following substances: 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene, and naphthalene (6).

According to the file material reviewed, there are several environmental problems at the Standard Chlorine site. One concern is the chromium-laden slag that was used as fill at the site. The fill material came from the adjacent Diamond Alkali property where a chromium chemical plant was operated until the mid-1970's. Weston's hydrogeologic investigation showed that while chromium

concentrations in the fill material were high, there was little chromium in the groundwater and only minor amounts of hexavalent chromium were found (8).

Chromium stains on the surface soil were observed during the site reconnaissance.

Weston also analyzed for organic compounds at the Standard Chlorine site. A wide range of volatile organic compounds were detected in both sediment and groundwater samples. These included: ortho-, meta-, and paradichlorobenzenes, chlorobenzene, 2,3-dibenzofuran, naphthalene, bromobenzene, trichlorobenzene, chlorotoluene, and trichloroethane (8).

There are two unlined lagoons on-site that were used for disposal of process wastewater during the years of Koppers' ownership. Koppers disposed of spent sulfuric acid and caustic soda from naphthalene cooking operations in the lagoons (5). According to file information, Standard Chlorine disposed of wastes generated from trichlorobenzene production in the lagoons (6). The lagoons, are adjacent to one another and cover an area approximately 400 feet by 80 feet, near the Hackensack River (Figure 2). There is the potential for the contents of the lagoons, which are 3 feet deep, to spill over into the river during times of flooding (2,7). During a 1981 NJDEP inspection, unidentified odors were noticed in the lagoon area (2).

2.0 POTENTIAL DIOXIN CONTAMINATION

2.1 Use, Production, or Disposal of Dioxin-Associated Chemicals

Standard Chlorine uses two dioxin-related compounds at this site: 1,2,4-trichlorobenzene and orthodichlorobenzene (6). These compounds are listed as Class III compounds by EPA, i.e., compounds with less likelihood to be associated with dioxin formation than Class I and II compounds (1).

2.2 Storage and Handling Methods

In a Selected Substance Report dated October 1983, Standard Chlorine reported that orthodichlorobenzene was produced at the plant from 1963 to November 1981. Purchased mixed dichlorobenzene isomers were separated by continuous fractional crystallization and the separated isomers were stored on-site for later sale. Annual production averaged 2,500,000 pounds of technical orthodichlorobenzene. The report states that no waste products were generated (6). Currently, orthodichlorobenzene and an emulsifier are blended in dedicated tanks to produce Chloroben. The orthodichlorobenzene is brought to the site in tank trucks (9).

According to the October 1983 Selected Substances Report, 1,2,4-trichlorobenzene was produced by fractional distillation between 1970 and 1980 and stored on-site until it was sold. An estimated 1,500,000 pounds of technical trichlorobenzene were produced each year. Solid waste produced in this process was allegedly disposed of in the on-site lagoons until July 1979 at an average rate of 12,000 pounds per year. Standard Chlorine also estimates that 1,500 pounds per year of 1,2,4-trichlorobenzene were released in air emissions and 5,000 pounds per year were released in wastewater discharge (6).

2.3 Past Sampling Efforts

There were no records in the NJDEP or EPA files reviewed which indicated previous soil, sediment, groundwater, or surface water sampling at the Standard Chlorine site specifically for dioxin analysis.

3.0 SITE RECONNAISSANCE AND RATIONALE FOR SAMPLING LOCATIONS

3.1 Summary of Site Reconnaissance

On March 14, 1985, E.C. Jordan Co. personnel (W. Britton and C. Moore) and an NJDEP representative (E. Stevenson) met with the Special Projects Manager (N. Stufano) and the Vice-President of Legal Affairs (M. Weiner) of the Standard Chlorine Chemical Co., Inc. at the Kearny plant. The meeting consisted of two parts: (a) an interview during which site use history and production practices were discussed; and (b) a tour of the facility under the direction of Mr. Stufano.

Ten sample areas have been identified at this site, based on the observations made during the site visit and information gained as part of the file search. These areas, shown on Figure 2, are:

- o storage tanks at west end of site;
- o rail siding at south side of site (near dichlorobenzene building);
- o drainage ditch area in southwest section of the facility;
- o rail spur on the north side of the dichlorobenzene building;
- o open areas devoid of vegetation;
- o rail siding in the north central section of the facility;
- o near the trichlorobenzene storage tanks in the northeastern section of the site;
- o near the dichlorobenzene storage tanks at the eastern end of the site;
- o the two lagoons at the eastern end of the facility; and
- o the low area between the east lagoon and the berm along the river bank.

3.2 Rationale for Sampling Locations

Most of the surface area of this site is unpaved. Consequently, any spills would either soak into the ground or collect in topographic low points. The offloading point for the dichlorobenzene storage tanks at the west end of the facility provides a good sample location. If spills occurred during unloading or if tank trucks leaked while standing in this area, the material would most likely be absorbed into the soil here. A similar situation exists along the two rail spurs which run along the south property boundary and also north of the dichlorobenzene manufacturing building. Therefore, samples should also be taken in these areas.

Surface runoff from the western half of the property enters a ditch which begins in the south-central part of the site. The water enters this ditch via sheet flow, although there are some small, ill-defined drainage swales near this ditch. These runoff points also serve as significant sample locations for this end of the property.

Even though most of the property has not been used for manufacturing operations since 1980, much of the site is still devoid of vegetation or has only a very sparse vegetative cover. Selected points within these open areas should also be sampled, especially since the surface soils are stained in many areas (the staining may be the result of spills or dumping of materials on the ground).

There is a short rail spur or siding that services the naphthalene manufacturing area. A depression or drainage swale is located between this siding and the main rail line. Samples should be collected from this depression since spills or runoff from the unloading of rail cars would probably collect in this swale.

In addition to the dichlorobenzene tanks at the western end of the property, there are also dichlorobenzene and trichlorobenzene storage tanks at the eastern end of the site. These tank areas merit sampling because spills may have occurred during the filling of the tanks or during the operation of the adjacent facilities. Beside the tank areas, samples should also be collected from the east and west lagoons at this end of the property. These lagoons, as noted earlier, were allegedly used for process wastewater until 1980. The area between the east lagoon and the river appears to serve as an overflow point during times of heavy water usage or during flooding.

Based on discussions with the NJDEP staff, it was agreed that 15 soil samples (not counting duplicates or field blanks) would be collected at this site. A site sampling plan, which identifies the sample locations, is included as Appendix A of this report. Appendix B contains the site specific health and safety plan.

4.0 SAMPLE COLLECTION AND ANALYSIS

4.1 Summary of Sampling Episode

On May 7, 1985, E.C. Jordan Co. personnel (W. Britton and C. Goodwin) collected 13 surface soil samples (including one duplicate) and three sediment samples at the Standard Chlorine site for analysis of 2,3,7,8-TCDD. Three representatives of the NJDEP (E. Stevenson, A. DeCicco, and W. Mennel) were present during the sampling. The sampling locations are shown in Figure 3. Samples were split at the request of the site owners. Appendix C contains a copy of the field data sheets. Slides of the sample sites are included in Appendix D.

The samples were collected in accordance with the sampling plan (Appendix A) with the following exceptions. Sample 23-1 was moved inside the dike surrounding the tanks located adjacent to the building where dichlorobenzene was formerly manufactured and stored. Sample 23-2 was relocated to obtain a soil sample near the loading dock of this same building in the event that spills may have occurred. Because of the very stony nature of the materials in this area, a stainless steel spoon and a screen were used in collecting the sample. Samples 23-4 and 23-5 were relocated to the bank of the stream since the swale leading to this area had been filled and/or regraded.

A layer of organic build-up on the top of the discharge pipe from Building 3C was observed and Sample 23-7 was taken there as a modified sediment sample. The soil collected as Sample 23-11 was too wet to be retained in a tulip bulb planter so a trowel was used for extracting the sample. A trowel was also used in collecting Sample 23-12 because of the granular makeup of the surface materials. Due to hard-packed soil conditions, Sample 23-14 was taken in an area where the ground could be more easily penetrated with a tulip bulb planter. Sample 23-15 was moved to the topographic low point in the open area where a sample was desired. The two lagoons formerly used for process wastewater storage had virtually dried up and Samples 23-16 and 23-17 were taken near the low points in these lagoons using tulip bulb planters rather than the gravity corer.

4.2 Summary of Results

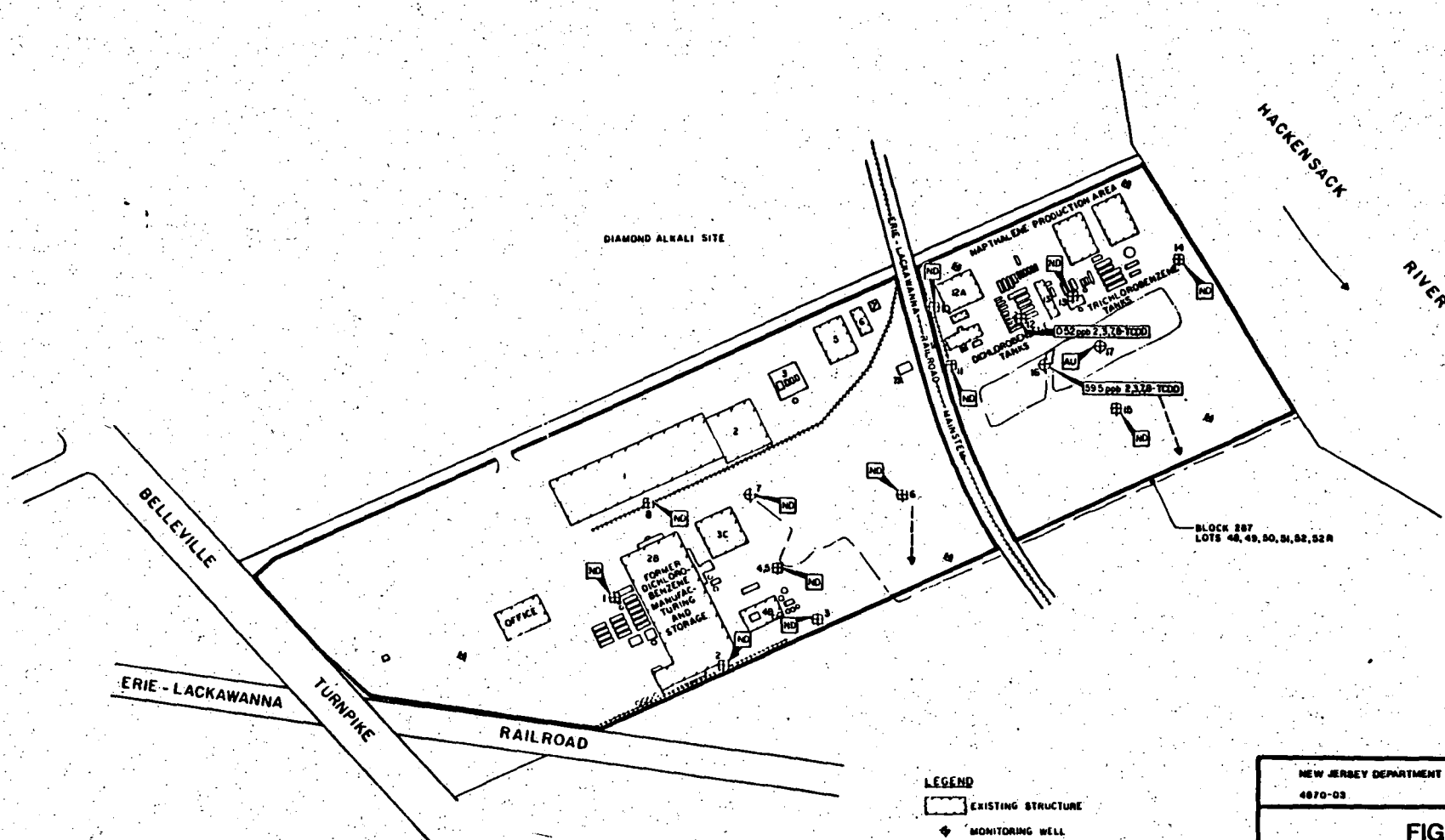
The method employed by ETC for the analysis of soil and sediment samples for 2,3,7,8-TCDD was the EPA September 1983 statement of work, "Dioxin Analysis, Soil/Sediment Matrix Multi-Concentration using Selected Ion Monitoring (SIM)

GC/MS Analysis with Jar Extraction Procedure." According to ETC, the accuracy of the analysis is directly dependent on the accuracy of the native TCDD stock solution. ETC uses the certified standard from the EPA as the primary standard to calculate the values in the sample. Cal-Analytical uses a comparable method for 2,3,7,8-TCDD analysis known as the EPA Invitation for Bid, Contract Laboratory Program, WA84-A002.

The results of the 2,3,7,8-TCDD analysis by ETC and Cal-Analytical for Standard Chlorine are shown in Table 1 and Figure 3. Data validation was performed by the NJDEP. Repeat analysis was required on four samples which did not initially pass ETC's internal quality assurance review. The second analysis was successful on only two of these samples (Samples 23-12 and 23-16). Sample 23-3 was then sent to Cal-Analytical for re-analysis. Sample 23-17 was not re-analyzed.

Of the 15 surface soil and sediment samples for which valid results were obtained, 13 contained no 2,3,7,8-TCDD. Sample 23-12, taken near the dichlorobenzene tanks, had a 2,3,7,8-TCDD concentration of 0.52 ppb which is below the 1.0 ppb action level currently utilized by the State of New Jersey. However, Sample 23-16, which consisted of sediment from the west wastewater lagoon, had a measured 2,3,7,8-TCDD concentration of 59.5 ppb. The east lagoon sample (Sample 23-17) was one of the two samples for which the repeat analysis was unsuccessful. This sample was not re-analyzed because the high concentration of the analyte found in the west lagoon strongly suggested contamination in both lagoons which would be further defined through follow-up sampling.

A duplicate sample was taken at sample location 4. The soil collected at this location was thoroughly mixed and then poured alternately into two sample bottles which were then sealed and submitted to the laboratory as a check on the consistency of the laboratory analysis. The analytical results for Samples



BASE MAP SUPPLIED BY PROPERTY OWNERS (AFTER PAID THE TAX FEE FOR THE TURN IN SLABBY, N.J. SHEET NO. 88 DATED JANUARY 14, 1965. BUILDING LOCATIONS ARE BASED ON A SITE PLAN DATED JUNE 1964 SUPPLIED BY STANDARD CHLORINE CHEMICAL CO.

LEGEND

- EXISTING STRUCTURE
- MONITORING WELL
- DIRECTION OF GROUNDWATER FLOW
- SURFACE SOIL SAMPLE
- SEDIMENT SAMPLE
- NO 2,3,7,8-TCDD NOT DETECTED
- UNSUCCESSFUL 2,3,7,8-TCDD ANALYSIS UNSUCCESSFUL

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
4870-03 JUNE 1988

FIGURE 3 SAMPLE LOCATIONS AND ANALYTICAL RESULTS

SITE: STANDARD CHLORINE
CHEMICAL COMPANY, INC.

EC JORDAN CO.

100 200 FEET

TABLE 1
RESULTS OF 2,3,7,8-TCDD ANALYSIS
STANDARD CHLORINE CHEMICAL COMPANY, INC.

Sample Collection Date: May 7, 1985
Sample Analysis Date(s): May 15, 16, and 17; June 16 and 17, 1985
Laboratory: Environmental Testing and Certification Corporation, Edison, New Jersey

| Sample Number | Figure Reference | 2,3,7,8-TCDD (ppb ¹) | | Sample Type |
|---------------|------------------|----------------------------------|-----------------|--------------------------|
| | | Measured | DL ² | |
| 23-1 | 1 | ND ³ | 0.15 | Surface soil |
| 23-2 | 2 | ND | 0.60 | Surface soil |
| 23-3 | 3 | ND ⁶ | 0.037 | Surface soil |
| 23-4 | 4 | ND | 0.62 | Surface soil |
| 23-5 | 5 | ND | 0.42 | Duplicate of Sample 23-4 |
| 23-6 | 6 | ND | 0.54 | Surface soil |
| 23-7 | 7 | ND | 0.67 | Sediment |
| 23-8 | 8 | ND | 0.23 | Surface soil |
| 23-9 | None | ND | 0.25 | Field/equipment blank |
| 23-10 | 10 | ND | 0.29 | Surface soil |
| 23-11 | 11 | ND | 0.16 | Surface soil |
| 23-12 | 12 | 0.52 ⁴ | -- | Surface soil |
| 23-13 | 13 | ND | 0.70 | Surface soil |
| 23-14 | 14 | ND | 0.62 | Surface soil |
| 23-15 | 15 | ND | 0.29 | Surface soil |
| 23-16 | 16 | 59.5 ⁴ | -- | Sediment |
| 23-17 | 17 | -- ⁵ | -- | Sediment |
| 23-18 | None | ND | 0.11 | Equipment blank |
| 23-19 | None | 4.90 | -- | Proficiency |

¹ ppb - Parts per billion, i.e., µg/kg of soil or sediment on an "as is" basis.

² DL - Method detection limit which is the concentration at which there is a 99 percent confidence level that the compound is present. ETC only reports detection limits for non-detect results.

³ ND - Not detected.

⁴ Repeat analysis.

⁵ Repeat analysis unsuccessful - failed surrogate recovery.

⁶ Result of re-analysis by California Analytical Laboratories of West Sacramento, CA on September 16, 1985.

23-4 and 23-5 were consistent. No TCDD was detected in either sample with detection limits of 0.62 ppb and 0.42 ppb, respectively.

A combined field/equipment blank was also submitted to ETC for analysis (Sample 23-9). The blank consisted of analyte-free soil supplied by the NJDEP which was poured through a tulip bulb planter into a foil pan and then into an empty sample bottle at the site. The bottle was then sealed and submitted to the laboratory as a check on possible contamination from the sample site, sampling equipment, or sample containers. TCDD was not detected in the field/equipment blank (detection limit of 0.25 ppb).

A proficiency sample supplied by the NJDEP was submitted to ETC with samples from this site. This sample serves as a check on analytical accuracy and may be comprised of one of three general types:

1. blank clay - nothing has been added to the sample;
2. spiked blank clay - dioxin isomers other than 2,3,7,8-TCDD have been added;
3. spiked soil - various levels of 2,3,7,8-TCDD have been added to the sample with a maximum spike of 10 ppb.

Sample 23-19 was a spiked soil with an acceptable accuracy range of 6.39 ± 0.84 ppb. The measured concentration of 4.90 ppb of 2,3,7,8-TCDD was below the lowest acceptable value of 5.55 ppb as defined by EPA. Therefore, the ETC data were qualified by the NJDEP as being biased low.

An additional equipment blank was submitted to ETC with samples from this site (Sample 23-18). The blank consisted of analyte-free water which was used to rinse a precleaned sediment corer. The rinsate was collected in a sample bottle which was sealed and submitted to the laboratory for analysis as a check

on equipment cleaning procedures. TCDD was not detected in the equipment blank and the detection limit was 0.11 ppb.

4.3 Assessment of the Need for Further Dioxin Sampling

The dioxin isomer 2,3,7,8-TCDD was detected at two locations at the Standard Chlorine site. The NJDEP action level of 1 ppb was exceeded at only one of these locations (Sample 23-16), the former process wastewater west lagoon. Analysis of the east lagoon sample (Sample 23-17) was unsuccessful on two occasions. The analyte was not detected at 12 other locations around the site. In addition, the result of analysis of the proficiency sample indicates that all ETC results are biased low.

Based on these results, it is recommended that additional sampling be conducted at the Standard Chlorine site in Kearny, NJ. The sampling effort should focus on the two former process wastewater lagoons in order to determine the extent of 2,3,7,8-TCDD contamination in this area. Additional sampling near the dichlorobenzene tanks is also warranted based on the low level of TCDD detected in Sample 23-12.

REFERENCES

1. Esposito, M.P., T.O. Tiernan, and F.E. Dryden, 1980. Dioxins. U.S. EPA 600/2-80-197, Cincinnati, OH.
2. Records on file as of January 31, 1985, NJDEP - Division of Waste Management, Hazardous Site Mitigation Administration, 428 East State Street, Trenton, NJ 08625.
3. Records on file as of January 31, 1985, NJDEP - Division of Waste Management, Bureau of Field Operations, 120 Route 156, Yardville, NJ 08620.
4. Records on file as of January 31, 1985, NJDEP - Division of Waste Management, Bureau of Field Operations, 1259 Route 46E, Parsippany-Troy Hills, NJ.
5. Records on file as of January 31, 1985, NJDEP - Division of Water Resources, 1174 Prospect Street, Trenton, NJ.
6. Records on file as of January 31, 1985, NJDEP - Office of Science and Research, Industrial Investigation Unit, 436 East State Street, Trenton, NJ.
7. Records on file as of January 31, 1985, U.S. EPA - Region II Office, Woodbridge Avenue, Edison, NJ.
8. Roy F. Weston, Inc., 1984. Hydrogeologic Investigation: Standard Chlorine Chemical Company, Inc., Kearny, New Jersey. Report for the NJDEP, W.O. 2384-02-01.
9. Interview on March 14, 1985 with Nicholas Stufano, Special Projects Manager, and Margaret Weiner, Vice-President for Legal Affairs, of the Standard Chlorine Chemical Co., Inc. in Kearny, NJ.
10. Ruppel, B., 1984. Dioxin in Fish from Northeast New Jersey Waters. NJDEP, Office of Science and Research, 436 East State Street, Trenton, NJ.

APPENDIX A

Site Sampling Plan

SITE SAMPLING PLAN

Client: NJDEP Project: Dioxin Investigation

Team Leader: C. Moore or W. Britton Team Members: R. Burger or C. Goodwin

SITE INFORMATION

Site Name: Standard Chlorine Chemical Co. Street: 1035 Belleville Turnpike

City: Kearny County: Hudson State: NJ 07032

Site Owner: Same As Above Phone No: (201)997-1700

Address: Same As Above

Date(s) of site activity: Week of April 29 or May 6, 1985

Sampling Objectives: To assess whether or not 2,3,7,8-TCDD is present
at the action level of 1 ppb.

Site Map Attached: Yes x No Site Active: x Yes No
Partially

METHODOLOGY

All sample collection, sample preservation, and associated quality assurance procedures used during this investigation will be in accordance with the standard operating procedures as specified in the Quality Assurance Project Management Plan (QAPMP) prepared for the State of New Jersey, Department of Environmental Protection for the Dioxin Site Investigation Program. All chain-of-custody and corresponding quality assurance procedures used during this investigation will be in accordance with standard procedures and protocols as specified by the State of New Jersey Department of Environmental Protection.

SITE SAMPLING PLAN

Site Name: Standard Chlorine

Sampling Requirements

| | | | | | | | | |
|-------------|--------------|-----------|-----------------|----------|----------|----------|-------|----------|
| Samples: | Surface Soil | <u>13</u> | Subsurface Soil | <u>0</u> | Sediment | <u>2</u> | Other | <u>0</u> |
| Duplicates: | Surface Soil | <u>1</u> | Subsurface Soil | <u>0</u> | Sediment | <u>0</u> | Other | <u>0</u> |
| Blanks: | Surface Soil | <u>1</u> | Subsurface Soil | <u>0</u> | Sediment | <u>0</u> | Other | <u>0</u> |
| Total: | Surface Soil | <u>15</u> | Subsurface Soil | <u>0</u> | Sediment | <u>2</u> | Other | <u>0</u> |

Sampling Procedures

Surface Soil: As specified in the generic QAPMP and on page A-3.

Subsurface Soil: Not applicable (NA)

Sediment: Specific sampling procedures are included as page A-4

Other: NA

SOIL SAMPLING WITH A SPOON OR TROWEL

1. Check all sampling equipment for cleanliness. Spoons, trowels, and screens should be precleaned using the cleaning procedure outlined for tulip bulb planters prior to use at any site. Field decontamination is not required because new equipment will be used between sample points at the same site.
2. Clean the surface area to be sampled of any debris (twigs, litter, large stones, etc.).
3. If the soil is too stony for the use of a tulip bulb planter, a large precleaned stainless steel spoon or trowel will be used to extract the soil sample.
4. If the soil is very gravelly or stony (such as in the ballast area of a rail siding) a precleaned screen may be used to segregate the finer materials.
5. Place the soil removed from the sample point into a clean, unused, disposable aluminum foil pan. When using a screen, place the screen over the pan and spoon the soil materials onto the screen. Repeat the process in adjacent portions of the cleared area until there is sufficient soil to fill a 1-quart sample jar approximately 3/4 full.
6. Using a stainless steel spoon, mix the soil thoroughly and place it into the sample jar after which the jar should be sealed.

SEDIMENT SAMPLING WITH A GRAVITY CORE SAMPLER

1. Check all sampling equipment for cleanliness. The gravity corer should be decontaminated prior to its use at any site and between sample points on the same site.
2. The sediment sample is collected by dropping the corer from a near surface position and allowing it to free fall through the liquid to the bottom.
3. Once the corer has become imbedded in the bottom in an upright position, release the messenger to activate the suction cup at the top of the corer.
4. Retrieve the corer with a smooth, continuous lifting motion. Do not bump corer as this may result in some sample loss.
5. Discharge the sediment from the corer into a large clean unused, disposable aluminum foil pan.
6. Repeat the above sample collection procedure in adjacent areas until there is sufficient sediment to fill a 1-quart sample jar approximately 3/4 full.
7. Allow the sediment to settle in the pan, which should only take 2 to 3 minutes (only the heavier materials will be collected), then decant (pour) the water from the surface.
8. Remove and discard any foreign materials (stones, pieces of wood or bark, aquatic weeds etc.) using either a precleaned stainless steel spoon or tongs.
9. Using the spoon or tongs homogenize (mix) the sediment and then transfer the sample into the appropriate sample jar.

DECONTAMINATION PROCEDURES

The decontamination procedures to be used in the field are the same as those followed when initially cleaning the corer prior to its being shipped to the field. These cleaning procedures are as follows:

1. Wash thoroughly with distilled water.
2. Rinse with deionized water.
3. Rinse with pesticide-grade acetone.
4. Rinse with pesticide-grade hexane.
5. Allow to air dry.
6. Place core barrel in plastic bag prior to storing or moving between sample points.

SITE SAMPLING PLAN

Site Name: Standard Chlorine

Site Number: 23

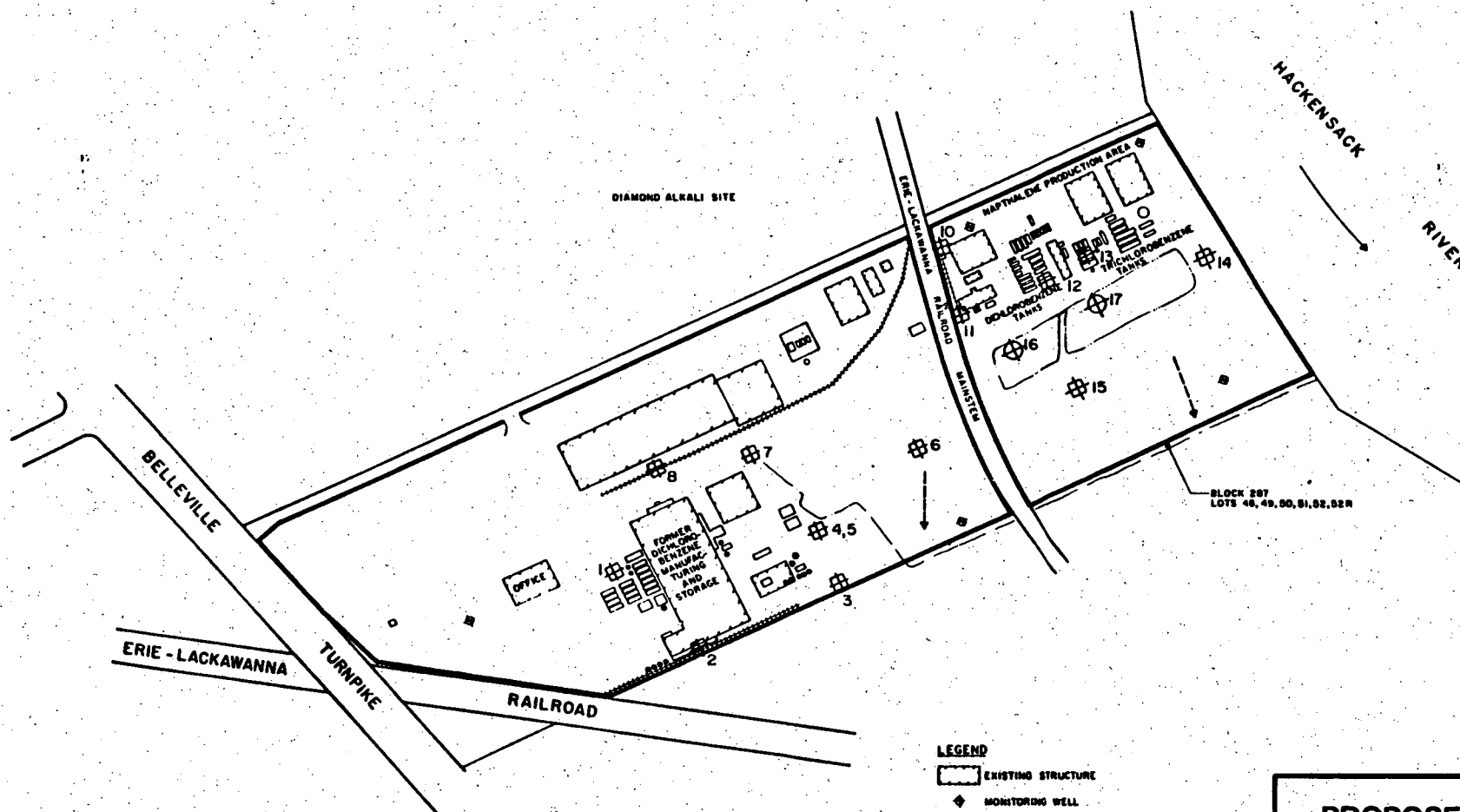
| Sample ID | Map Reference | Sample Location | Justification |
|-----------|---------------|--|--|
| 23-1 | 1 | Storage Tanks - Western End of site | During offloading of dichloro-benzene spills may have occurred in this area. |
| 23-2 | 2 | Rail Spur at South Property Boundary | Raw materials were probably brought into the site via this point. There may have been spills during unloading or leaks while tank cars were standing in this area. |
| 23-3 | 3 | Drainage Area | Surface runoff from southwestern part of the site moves via sheet flow or ill-defined drainage swales. This is a small pocket of a swale area. |
| 23-4 | 4 | Surface Runoff Point | Same as for Sample 23-3 except this swale drains a different area. |
| 23-5 | 5 | Surface Runoff Point | Duplicate of Sample 23-4. |
| 23-6 | 6 | Open Area - Western End of Property | Area which is devoid of vegetation even though this part of site is not being used. |
| 23-7 | 7 | Outfall at Drainage Ditch | Surface runoff from portions of the site are piped to this point where it discharge into a drainage ditch. |
| 23-8 | 8 | Rail Spur - North-Western Part of Property | This is an offloading and/or loading point for raw materials or finished products. This may have been a point of spills during plant operation. |
| 23-9 | None | Field Blank | Sample to be provided by NJDEP. |

SITE SAMPLING PLAN

Site Name: Standard Chlorine

Site Number: 23

| Sample ID | Map Reference | Sample Location | Justification |
|-----------|---------------|--|--|
| 23-10 | 10 | Rail Siding - For Naphthalene Operation | Raw materials were probably brought in via this point when this part of the site was operating. Sample to be taken in "ditch" area between the two sets of tracks. |
| 23-11 | 11 | Rail Siding - For Naphthalene Operation | Same as for Sample 23-10 except near the terminus of the siding (near a catch basin between the tracks). |
| 23-12 | 12 | Dichlorobenzene Storage Tanks - Eastern End of Site | Spills may have occurred during the filling of these tanks or during the transfer of the material to the manufacturing area. |
| 23-13 | 13 | Trichlorobenzene Storage Tanks - Eastern End of Site | Same as for Sample 23-12 except at a different set of tanks. |
| 23-14 | 14 | East End of East Lagoon | This area is a potential overflow point from the lagoons during periods of high water usage or if the lagoons cease to underdrain. |
| 23-15 | 15 | Open Area - Eastern End of Property | Same as for Sample 23-6 except in the back half of the site. |
| 23-16 | 16 | West Lagoon | Information in the NJDEP files indicate the west lagoon was used for process wastewater until 1980. Sediment sample to be taken near inlet pipe. |
| 23-17 | 17 | East Lagoon | Same as for Sample 23-16 except in the east lagoon. |



LEGEND

- EXISTING STRUCTURE
- MONITORING WELL
- DIRECTION OF GROUNDWATER FLOW
- CATCH BASIN
- SURFACE SOIL SAMPLE
- SEDIMENT SAMPLE

PROPOSED SAMPLING LOCATION PLAN

SITE: STANDARD CHLORINE
CHEMICAL COMPANY, INC.

EC. JORDAN CO.

0 100 200 FEET

APPENDIX B

Site Specific Health and Safety Plan

SITE INVESTIGATION TEAM
SITE SAFETY PLAN

A. GENERAL INFORMATION

SITE: Standard Chlorine

LOCATION: 1035 Belleville Turnpike, Kearny, NJ 07032

PLANS PREPARED BY: C. Moore, W. Britton DATE: April 19, 1985

APPROVED BY: *Robert A. Sten* DATE: 19 April 85

OBJECTIVE(S): To insure protection of personnel during collection of samples
for dioxin analysis.

PROPOSED DATE OF INVESTIGATION: Week of April 29 or May 6, 1985

BACKGROUND REVIEW: Complete: x Preliminary:

SUMMARY OF HAZARD EVALUATION: OVERALL HAZARD: Serious: Moderate:

Low: x Unknown:

Surface soil samples and sediment samples will be collected.

B. SITE CHARACTERISTICS

FACILITY DESCRIPTION: Plant manufactures chloroben, a drain cleaner; formerly
produced paradichlorobenzene and naphthalene.

Unusual Features (dike integrity, power lines, terrain, etc.) Several
buildings are vacant and in disrepair.

Status: (active, inactive, unknown) Active

History: (Worker or non-worker injury; complaints from public; previous
agency action): Nothing reported.

C. SITE SAFETY WORK PLAN

Team Member

Responsibility

W. Britton or C. Moore

Site Safety Manager

R. Burger or C. Goodwin

Sampler

PERIMETER ESTABLISHMENT: Map/Sketch Attached Yes Site Secured? No

Perimeter Identified? Yes Zone(s) of Contamination Identified? Yes -

surface soil has high chromium concentration and a number of volatile organic chemicals.

PERSONAL PROTECTION

Level of Protection: A B C x D

Modifications: Respirators will be worn (1) during sample collection and handling, (2) whenever PI meter readings warrant them, (3) whenever windy or dusty conditions prevail.

Surveillance Equipment and Materials: Photoionization meter (PI meter)

DECONTAMINATION PROCEDURES: Personnel will dispose of protective clothing at completion of sampling and will shower as soon as possible after leaving the site. Sediment corers, sample bottles, surveillance equipment, respirators, and cameras will be wiped with clean cloths before leaving the site.

SITE ENTRY PROCEDURES: Access obtained by the NJDEP

WORK LIMITATIONS (Time of day, etc.): Daylight only

INVESTIGATIONS-DERIVED MATERIAL DISPOSAL: Tulip bulb planters, foil pans, foil, protective clothing, and wiping cloths will be put in double plastic bags and turned over to the NJDEP for disposal. Non-disposable equipment (e.g., spoons) will be double-bagged and held by E. C. Jordan for later decontamination.

D. EMERGENCY INFORMATION

LOCAL RESOURCES

Ambulance _____ 998-1313
Hospital Emergency Room _____ 991-3400
Poison Control Center _____ (800)962-1253
Police _____ 998-1313
Fire Department _____ 998-1400
Airport _____ Newark 961-2000

SITE RESOURCES

Water Supply _____ Yes--Bottled
Telephone _____ Yes--(201)997-1700
Radio _____ N/A
Other _____

EMERGENCY CONTACTS

1. Dr. Frank Lawrence (207) 871-2617
2. Bruce Campbell, RPh. (207) 871-2449
3. Maine Poison Control Center. (207) 871-2950
4. E.C. Jordan (Maine). (207) 775-5401
5. E.C. Jordan (Florida). (904) 656-1293
6. E.C. Jordan (Detroit). (313) 569-3955
7. Envirologic Data (207) 773-3020
8. Robert Predale, NJDEP (609) 633-6801

F. EMERGENCY ROUTES

(Give road or other directions; attach map)

HOSPITAL: From driveway, turn left; take the first right onto Route 508 and
right again on Schuyler Ave. (1st light); after 3 lights, turn left;
the hospital is in the second block on the right. (See attached
map.)

APPENDIX C
Field Data Sheets

Site STANDARD CHLORINEDate 5-7-85Page 1 of 6Samplers W. BRITTON/C. GOODWINWeather WINDY/Cloudy

NDEP:

| Sample I.D. | H ₂ O Map. Ref. | E.T.C. I.D. | P.I. Levels | 1043 Roll/Picture No. | Notes |
|-------------|-------------------------------|-------------|-------------|--------------------------|---|
| 23-1 | 1 | H6387 | 1 | 11:18 H21 2-2+3 | Blank on Seal tube |
| 23-2 | 2 | H6388 | 2 | 11:52-11:55 2-4 | Moved inside dike |
| 23-3 | 3 | H6389 | 2 | 12:06-12:10 2-5 | Moved to loading dock |
| 23-4 | 4 | H6390 | 1 | 12:26-12:32 2-6 | (R) used screen on seal vermiculite present |
| 23-5 | 5 | H6391 | " | " " " " | At rock berm to Pond |
| 23-6 | 6 | H6392 | 1 | 1:15-1:19 2-9 | (Dup.) " |
| SED 23-7 | 7 | H6393 | 1 | 12:49-12:53 2-7 | open field - low point |
| 23-8 | 8 | H6394 | 1 | 1:02-1:05 2-8 | Organic layer - mouth of ditch |
| SED 23-9 | - | (H6395) | Blank | 1:07-1:11 2-10 | low point |
| 23-10 | 10 | H6396 | 2 | 1:45-1:48 2-9 10 | Large piece of brick |
| 23-11 | 11 | H6397 | 2 | 2:03-2:07 2-10 11 | Soft material betw. RR |
| 23-12 | 12 | H6398 | 20' | 2:22-2:25 2-11 12 | USED TROWEL Screened small rocks by CB USED TROWEL Wounded trunk High P1 |

General Notes:

SAMPLER BLANK
 FAILED IN FOLLOWING
 ORDER A-4 A-5
 A-7 A-6

Map on back

E.C.JORDAN CO. 4670-04

Dioxin Site Investigation - New Jersey Dept. of Env. Prot.

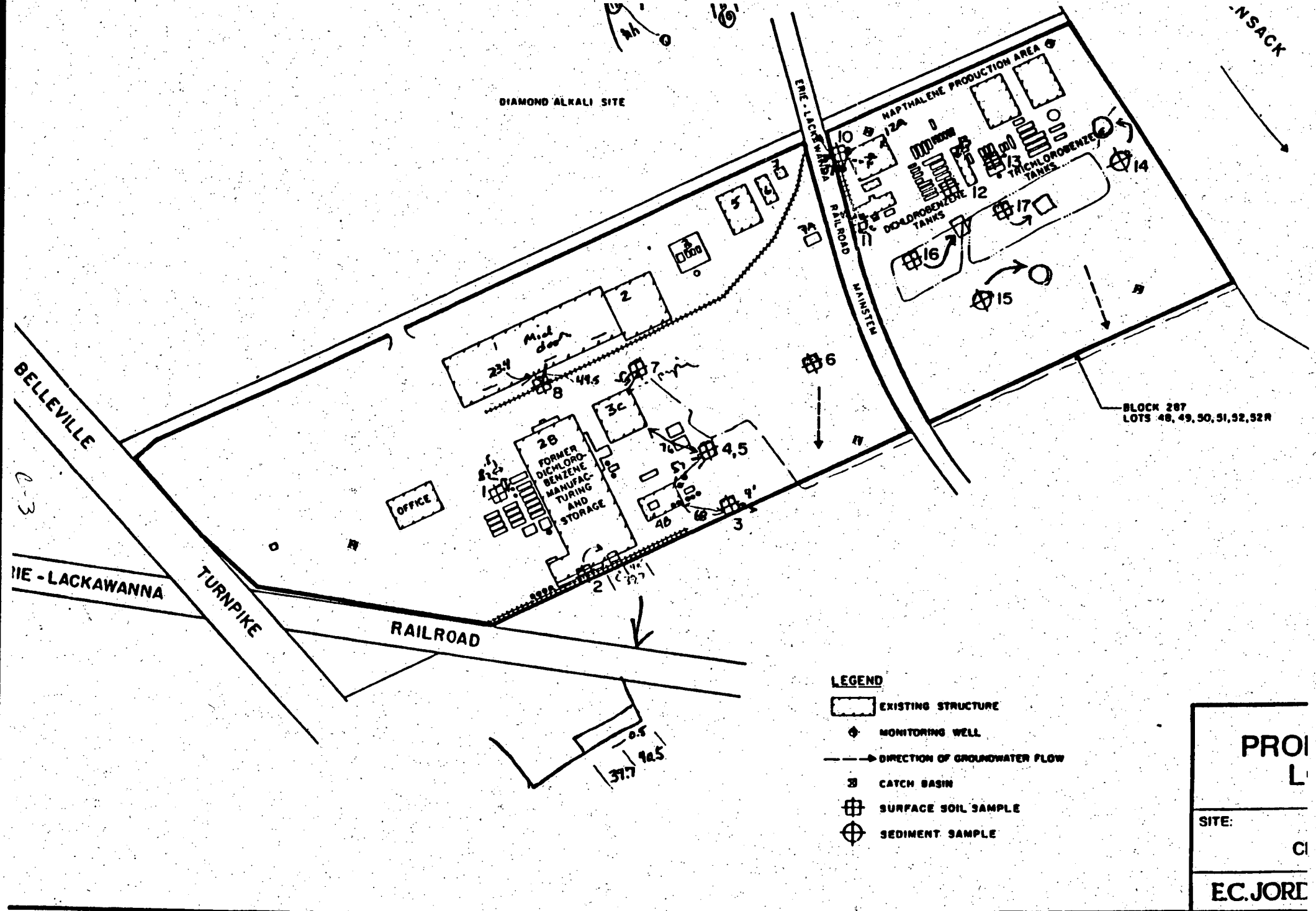
Site STANDARD CHLORINEDate 5-7-85Page 2 of 6Samplers W. BRITTON/C. GOODWINWeather WINDY / CLOUDY

| Sample I.D. | Map. Ref. | E.T.C. I.D. | P.I. Levels | ^{seal} Roll/Picture No. | Notes |
|-------------|---------------|-------------|-------------|-------------------------------------|-----------------|
| 23-13 | 13 | H 6399 | 10 | 236-239 2-13 | By Tanks |
| 23-14 | 14 | H 6400 | 1 | 253-256 2-14 | Moved sample pt |
| 23-15 | 15 | H 6401 | 1 | 309-311 2-15 | (R) open area |
| SED 23-16 | 16 | H 6402 | — | 346-349 2-17 | Side of lagoon |
| 23-17 09 | 17 | H 6403 | — | 407-409 2-18 | Field Blank |
| 23-18 | — | H 6999 | — | 1043 | SAMPLER BLANK |
| 23-19 | — | H 6486 | — | | SPIKED SAMPLE |

23-17 17 H 6395 — 338 2-16 ^{Mid of lagoon}
 341 No # on seal - ES

General Notes:

Map on back



Site Standard Chlorine Chemical Date May 7, 1985
Company, INC.

Page 4 of 6Sample I.D.General Notes

- 23-1 surface soil sample inside dike 3' out and 8' in
from northernmost tank adjacent to Bldg. 2B
- 23-2 surface soil sample taken east of loading dock Bldg. 2B
39.7' from east end of loading dock and 40.5' ^{from} E end
of Bldg. 2B.
- 23-3 surface soil sample 68' SE corner Bldg. 4B and
4' from S property line
- 23-4 surface soil sample 57' NE corner Bldg. 4B and
76' SE corner Bldg. 3C. On bank of pond.
- 23-5 Duplicate of sample 23-4
- 23-6 surface soil sample taken at the low point of
open field area west of Erie-Packawana RR
Mainstem
- 23-7 sediment build-up sample taken from top of discharge
pipe 45' from NE corner Bldg. 3C

Site Standard Chlorine Conc. Date 5-7-85Page 5 of 6

| <u>Sample I.D.</u> | <u>General Notes</u> |
|--------------------|--|
| 23-8 | surface soil sample. 44.5' from mid-door Bldg. 1 and 23.4' from S bldg. line line Bldg. 1 |
| 23-9 | Field/equipment blank sample |
| 23-10 | surface soil sample taken between RR tracks 42' from NW corner Bldg. 12A and 45' from edge of road |
| 23-11 | surface soil sample taken at CB located adjacent to end of RR spur |
| 23-12 | surface soil sample below diethylbenzene tanks adjacent to Building 13 |
| 23-13 | surface soil sample taken inside dike and beneath triethylbenzene tanks |
| 23-14 | surface soil sample taken in center of roadway at NE corner of East Pagoon |

Site Standard ChlorineDate 5-7-85Page 6 of 6Sample I.D.General Notes

23-15 surface soil sample taken at center of large open area south of lagoons

23-16 modified sediment sample taken at NE corner of West lagoon

23-17 modified sediment sample (taken w/ tulip bulb planter) in center of east lagoon

23-18 Field/equipment blank. (DI WATER)

23-19 Spiked sample

APPENDIX D

Slides of Sampling Locations

Slides of this site are included in the original of this report which is on file with the New Jersey Department of Environmental Protection, Division of Waste Management at 428 East State Street, Trenton, New Jersey.